

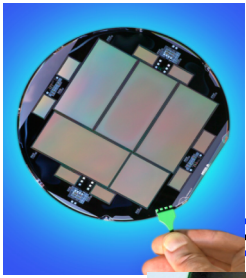
# *CCD ESD Training*

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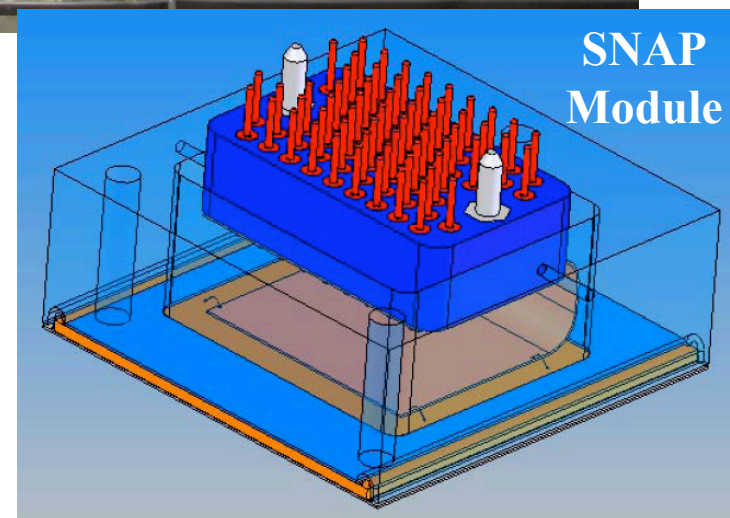
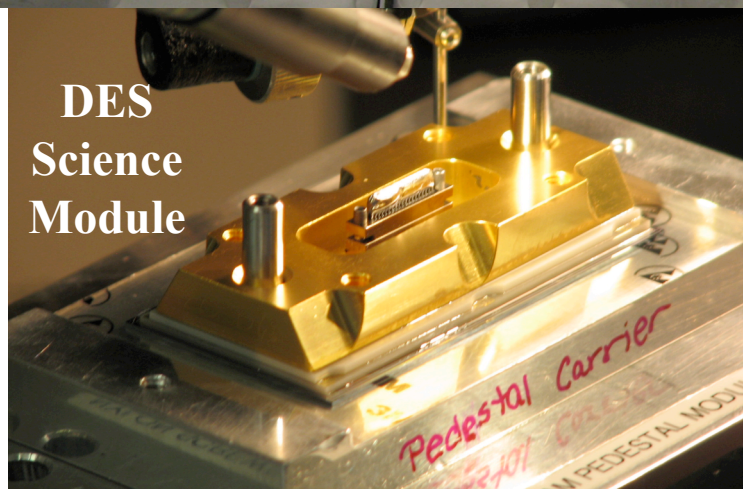
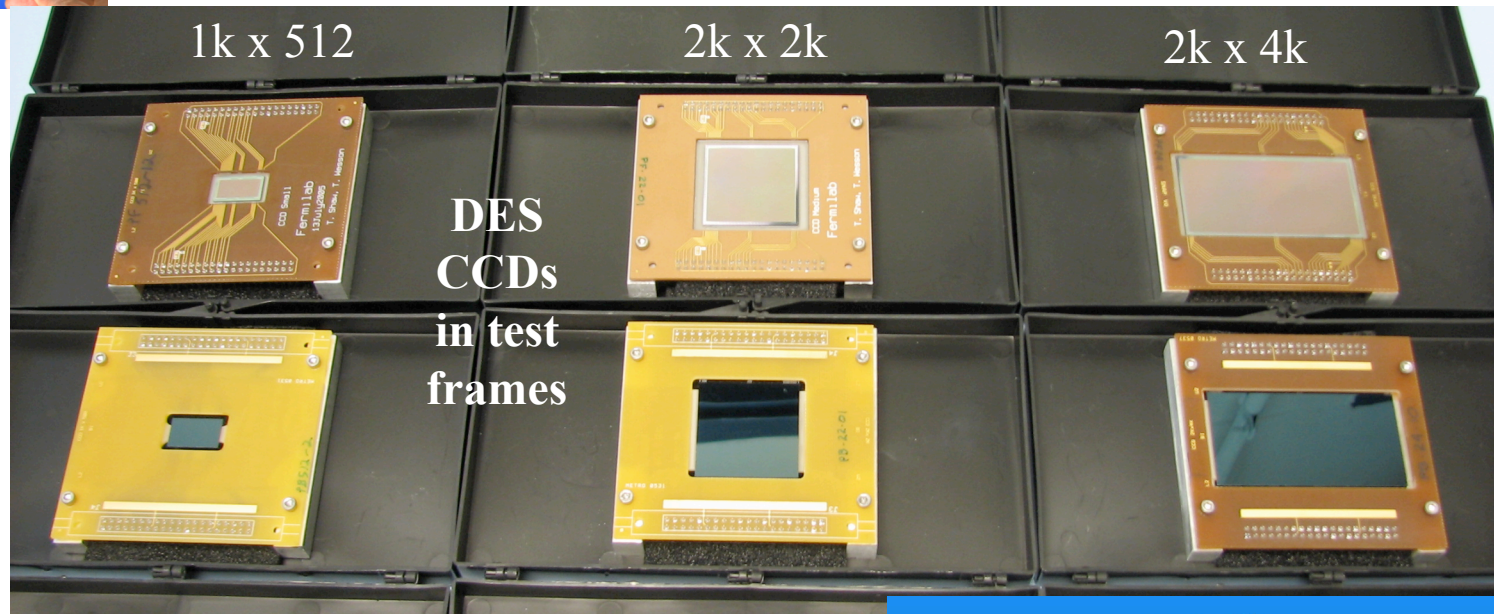
## *CCD ESD Training; Beyond The Video...*

*:: Greg Derylo ::*

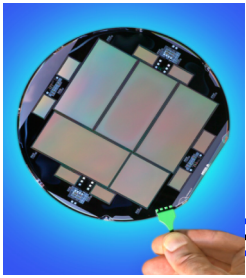
DES & SNAP CCDs  
ESD Damage Modes  
Personal Controls  
Work Area Controls  
Equipment / Tooling Controls  
CCD Handling Guidelines



# *CCD ESD Training* *DES & SNAP CCDs*



Greg Derylo  
Nov 2007

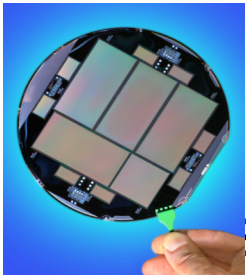


# *CCD ESD Training*

## *ESD Damage Modes*

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- Human Body Model
  - A charged person comes into direct contact with the device
  - Risk addressed by minimizing charge generation and ensuring personnel grounding
- Charged Device Model
  - The item picks up a charge from the handling and then discharges it when coming into contact with a grounded object
  - Risk addressed by minimizing charge buildup on the part and by using static-dissipative rather than conductive materials when contacting the item
- Field Induction Model
  - The item picks up charge from nearby electric fields and then discharges it when coming into contact with a grounded object
  - Risk addressed by minimizing electric fields near the part and by using static-dissipative rather than conductors when contacting the item
- Machine Model
  - Voltage discharge from equipment or tools that come in contact with the device.
  - Risk is minimized by controlling equipment grounds and using static-dissipative materials for contact rather than conductors

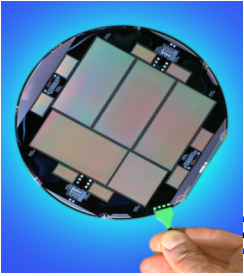


# *CCD ESD Training*

## *CCD Handling Guidelines – Personal Controls*

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- WRIST STRAP – Use continuous monitor, but strap resistance to be periodically measured with an ohmmeter to be  $< 2 \text{ M}\Omega$ . Wear against skin, not glove or labcoat cuff.
- FOOTWEAR – Wear approved static-safe shoes, not booties. Good backup, but resistance still too high to be a reliable replacement for a wrist strap. Only effective on conductive or static-dissipative floors. Keep them clean!
- LABCOAT – Blue coat with black thread. Sleeve cuffs must be in contact with skin.
- HAIR NET – No nylon mesh nets! Wear Tyvek instead.
- GLOVES – Powder-free nitrile, not latex. Also important for handling parts that go into vacuum.
- FACE MASK – No mask has yet been approved for use.



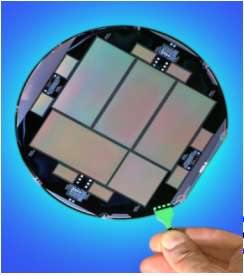
# *CCD ESD Training*

## *CCD Handling Guidelines – Work Area Controls*

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- GENERAL GUIDELINES – Keep work area clean and clutter-free. Non-essential insulating materials should be removed or covered in static-dissipative tape.
- BENCHTOP MATS – Keep them clean.
- TABLES & HOODS – Nearby metal equipment must be grounded.
- FLOORING – Conductive (metal) or static-dissipative (mat or wax). Keep clean to ensure good electrical contact and reduce contamination.
- HUMIDITY – Moisture in the air helps reduce and dissipate charge. Do not handle CCDs below 35% RH. Work area should have audible RH alarm.
- AIR IONIZER – Use an ionizer to help dissipate built up charges. These have slow response times and a limited reach – they are not a silver bullet!
- CHAIRS – Use static-safe chairs that are grounded to the floor. Plug in wrist strap before sitting and unplug after standing.
- GARBAGE CAN – No nearby plastic cans or can liners.



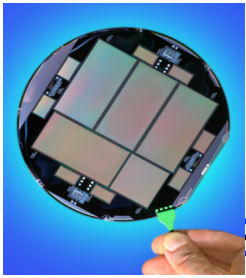
## *CCD ESD Training*

### *CCD Handling Guidelines – Equipment / Tooling Controls*

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- TOOLS / FIXTURES / ETC. – Static dissipative materials to be used where possible; conductors where necessary. Insulators like tool handles should be replaced with safe materials or wrapped with static-dissipative tape.
- CCD STORAGE CONTAINERS – During transport & storage, CCDs must be kept in a static-dissipative container than is then sealed in an ESD-safe shielding bag.
- CCD DRYBOX – Storage cabinets should be made from anti-static materials and have grounded shelf surfaces (static-dissipative or conductive). Cabinets should be labeled to indicate that they contain ESD-sensitive components and are for DES project use only.



# *CCD ESD Training*

## *CCD Handling Guidelines*

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- CCDs are very valuable
  - Handling tasks must be carefully pre-planned
  - Written procedures should be generated to plan work and control consistency
  - If something seems wrong during work, stop and ask!
- Be sure to treat connectors and the ends of cables with the same level of care as the CCDs themselves.
  - Leads must be shorted together when not plugged in.
- Work areas should be periodically surveyed to verify personal grounding effectiveness, surface conductivities, grounds, ionizer operability, etc.
  - Inspection log to be posted in each work area to document survey results.